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BOTANICAL NAMES IN ENTOMOLOGICAL PAPERS AND HABITAT STUDIES

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THERE IS A DISTINCT NEED, in all fields of zoological writing, for more *consistency* and *accuracy* in the recording of botanical names. When phytophagous species are involved, or the paper deals with distribution or habitat description, etc., it is inexcusable for the writer to be any less accurate with the plant names than he is with the names of insects (or other animals) mentioned in the same paper. Three major points should always be kept in mind:

- (1) Give the COMPLETE SCIENTIFIC NAME, whenever accurate determination is possible (genus, species, and variety if any). *At least* include the generic name.
- (2) If the scientific name has been fully determined, include also the COMPLETE CITATION OF AUTHOR(S). Note the differences between zoological and botanical rules of nomenclature with regard to complete author citations (Lanjouw et al., 1966). As in zoological writing, where the same scientific name is repeated more than once in a paper, the author citation need only be given once (preferably at the first place in the text where the name is used.)
- (3) The plant FAMILY should always be given once, as a matter of course, for every plant generic name mentioned in a paper, *at least in the case of foodplant records*. The importance of this point to those who are interested in distribution, or rearing and life history investigation, cannot be over-emphasized. (For a world dictionary of the families of described genera of flowering plants and ferns see Willis, 1966.)

A certain percentage of lepidopterists are, of course, quite familiar with the families of (at least some) plants in their own local districts or countries. But the major need for including families arises when one considers readers in other countries; they will often overlook (or fail to realize) very interesting comparisons of foodplant preferences (between certain insects in their own country and others covered in a foreign paper), if the family name is not included. When one does not have access to the Willis dictionary—and many do not—it can sometimes be very difficult to discover the family of an unfamiliar foreign plant genus, and particularly in the case of tropical plants. It is but little extra work for the author to include plant family names *at the time of the writing*; in the process of determination he will come across the families anyway, or will learn them from plant taxonomists.

This thought is directed to any lepidopterist in North America whose interests extend beyond mere political borders: If you were interested in lycaenids, and saw reference to a foodplant of certain Australian *Ogyris* spp. (large, metallic-blue hair-streaks) given simply as the plant generic name "*Amyema*," this might not convey much, nor would it greatly increase your worldwide understanding of lycaenid foodplant preferences. . . . *However*, had the writer bothered to include, in parentheses after *Amyema*, the family name (LORANTHACEAE — a mistle-toe), considerable interest, and increased potential understanding, would have been instantly incorporated into the paper with but slight additional effort on his part. Similarly, how many Australian readers of an American paper, upon seeing the plant generic name "*Phoradendron*" mentioned as the foodplant of a large, metallic-blue hairstreak widespread in the United States (*Atlides halesus* Cramer), would recognize this generic name instantly as applicable to a plant *also* in the LORANTHACEAE? Such omissions, to the *potential* value of papers containing foodplant records, are seen everywhere in the literature (including, I readily confess, earlier papers by the present writer).

Knowledge of a possible foodplant family is exceedingly useful to those wishing to rear larvae (from eggs obtained in captivity) of a moth or butterfly whose foodplant is entirely unknown, as is so frequently the case in Australia, New Guinea, Central or South America, and Africa, for example.

If one knows the family to which belongs a foodplant of the *nearest relative* of the insect one is trying to rear (even if the only plant recorded is of but a distant relative), one's chances for locating an *acceptable* foodplant are considerably increased. (This often means the difference between failure and success in obtaining larvae for preservation and study.) Knowing the foodplant genus, of a near relative of the insect,

is *not* necessarily always as helpful as knowing the family to which its foodplant belongs; experience will demonstrate this point time and again. Far more alternatives come up for consideration when one knows the foodplant family. (McFarland, 1961, 1964).

To carry this one step higher, it is sometimes equally helpful to know the order to which a possible foodplant might belong. For a worldwide summary of plant orders, and most of the families contained in each, see Benson (1957), pp. 110-114, 328, 500, 536; also, see Melchior (1964), and Thorne (1968). Thorne's synopsis includes superorders (-iflorae), orders (-ales), suborders (-ineae), families (-aceae), and subfamilies (-oideae), and is worthy of close study by anyone interested in lepidopterous early stages or distribution, etc.

While still on the topic of plant families, the need for *standardization* of all family name endings (column B, below), now being recognized by more and more botanists (for example Eichler, 1965; Thorne, 1968), should be mentioned. This is certainly in keeping with any desire for clarity and consistency. All animal family names now in use consistently end with "-idae." Why not 100% consistency with plants? The following 8 family names (column A) are the only remnants of this long-standing inconsistency:

(A) Sanctioned by long usage, but ending irregular:	(B) Alternative family name using standard ending:
Compositae	(or)
Cruciferae	(or)
Gramineae	(or)
Guttiferae	(or)
Labiales	(or)
Leguminosae	(or)
Palmae	(or)
Umbelliferae	(or)
	ASTERACEAE
	BRASSICACEAE
	POACEAE
	CLUSIACEAE
	LAMIACEAE
	FABACEAE
	ARECACEAE
	APIACEAE

Whether or not the name with the standard ending (derived from the name of a genus in the family) is applied remains a matter of individual choice; *either* ending is correct (according to the Code) in the above cases. The tendency, however, should be toward uniformity or standardization, especially in view of the fact that the remaining (approx.) 98% of described plant families are known by regularly formed names with the standard ending, while the above 8 families form a 2% exception to the rule as long as the names in the first column remain in use.

If the Leguminosae are treated as *one* family, use FABA-

CEAE; if split up into 4 families (or subfamilies, according to the writer's interpretation), examples or representative genera would be as follows: MIMOSACEAE or Mimosoideae (*Acacia*, *Albizia*, *Calliandra*, *Mimosa*, *Prosopis*, etc.); CAESALPINIACEAE or Caesalpinioideae (*Caesalpinia*, *Cassia*, *Cercidium*, *Cercis*, *Gleditsia*, *Gymnocladus*, *Tamarindus*, etc.); KRAMERIACEAE or Kramerioideae (only one American genus, *Krameria*); FABACEAE or Faboideae (includes by far the majority of genera, among which are *Astragalus*, *Crotalaria*, *Daviesia*, *Dillwynia*, *Faba*, *Genista*, *Lathyrus*, *Lotus*, *Lupinus*, *Medicago*, *Melilotus*, *Pultenaea*, *Robinia*, *Trifolium*, *Vicia*, *Wisteria*, etc.).

The following family name is almost invariably misspelled: "Capparidaceae"; this name is based on the genus *Capparis* L., and should be CAPPARACEAE (Eichler, 1965; Melchior, 1964; Lajouw et al., 1966, p. 212). Naiadaceae should be replaced by NAJADACEAE, Oenotheraceae by ONAGRACEAE, etc.

Agreement on the use of the terms "foodplant" and "host plant" is needed. In most earlier writings the former was apparently quite adequate, in connection with plants upon which larvae were known to feed; it is a simple and perfectly clear, useful word. (See Wheeler, 1939). Torre-Bueno (1937, pp. 105 and 129), separates these two terms in a way worthy of serious consideration in the interest of consistency. They should continue to be defined as he suggested:

- (1) "*HOST PLANT*—the plant on which an insect species has its preferred haunt or abiding place; in predacious Heteroptera, fixed by the preferred prey which lives on it."
- (2) "*FOODPLANT*—the plant on which an insect habitually feeds; not to be confused with host plant, on which the insect lives, since certain predacious forms haunt particular plants, which are the foodplants of their prey." (In view of its extensive use in entomological writing, "foodplant" is perhaps best written as one word, not separated or hyphenated; it then reads more smoothly, is written more easily, and stands out more clearly in the text.)

When the term host plant is employed in discussions connected with parasites, their hosts, and the plants eaten by the larval hosts, confusing or awkward wording can easily arise ("host plant of the host" or "the host host plant," etc.); this is hard to avoid unless the term *foodplant* is used to refer to the plant eaten by the host.

In view of its extensive use in entomological writing, foodplant

is perhaps best written as *one* word, unbroken; it then stands out more clearly in the text and reads more smoothly.

In connection with foodplant names on the labels of reared insect specimens, an unfortunate practice is widespread and should be stopped: This is the habit many collectors have of writing only the utterly useless word "bred" or "reared" (or some equivalent) on the label, occupying valuable space where, alternatively, the name of the plant genus (at least!) could appear, if not in fact the full name. Even if the collector kept a notebook in which foodplants were supposedly recorded, it often develops that the book cannot be found when it is needed, or its references are unclear in their application, or it was lost when he died (*or etc.*)—so his collection goes to the local museum carrying with it proof that he could rear Lepidoptera with success, but never is a plant name to be found on one of his labels! In such a collection it is not at all uncommon to come across reared species for which the foodplant is unpublished, and (once the collector has died) unknown, and *so it remains*; the potential value of his collection is thus reduced.

Plant identifications should never be glibly passed along from one worker to the next if the slightest doubt exists. Careful re-checking sometimes upsets deeply entrenched myths about supposed foodplants or preferences. Foodplant names intended for publication should always be re-checked (or verified) by a plant taxonomist. Where any uncertainty still remains, the writer should not be afraid to make use of the question-mark. Always double-check author citations in the most recent scholarly reference available for the locality. (For example, in the case of Black's South Australian flora, see Eichler, 1965.)

When foodplant records are new or were previously doubtful, or are from remote habitats, or when the determination is uncertain, it is highly advisable to collect good specimens, pressing, drying, and mounting them carefully, and including the exact locality, elevation, exposure, soil type, date, and collector's name on all labels. Such specimens should then be code-numbered and deposited in a herbarium, and reference to this fact should be made clear in related entomological papers. By "good" plant specimens I mean specimens as nearly complete as possible, which include buds, flowers, young and mature fruits, the *range* of leaf sizes and shapes, and typical stems. Obviously this is not always possible, but should be kept clearly in mind when collecting botanical material for identification. In the case of smaller plants, collect the entire plant in order to show the type of root system, and possible differences in basal leaves, etc. In the case of larger plants, a few comments about the

general growth-habit (shape, type of branching, average and maximum heights, etc.) are often valuable to include in the notebook entry or on the field label; also include notes on the trunk and bark (or *any* other distinctive features not shown by the collected material) of trees, shrubs, or vines. Such information will greatly facilitate identification when it is attempted later, and is very often required for a reliable determination at the specific or varietal level.

When reading long habitat plant-lists, check-lists of insects, or lists of foodplants, etc., it is generally more useful to find these in *alphabetical* order (at least from the genus down), for ease of comparison with other published information of a similar nature. (See McFarland, 1963, 1965b, 1967; McFarland and Colburn, 1968.) This is almost always a desirable refinement in format, with one major exception: When one wishes, for a definite reason, to show or imply phylogenetic relationships or evolutionary trends, and that is *the primary aim of the paper*. (For example, Ehrlich and Raven, 1964.)

With the snowballing world population explosion, leading to greatly increased pressure (direct and indirect), on all "wild" lands, the sooner biologists study the remaining unspoiled habitats with their present plant-animal associations, and *publish* this information, the better. As communications and world travel become ever more rapid, we are entering a period where insect families and genera, in relation to their habitats and foodplants, can be quickly, accurately, and *meaningfully compared* by workers the world over. Consistently accurate botanical determinations, coupled with unflinching mention of the plant families involved, would help to speed up this synthesis. Of course, attention to numerous other details, not discussed in this paper, would also help among these lines. Again, *consistency and uniformity of terminology and presentation* (format) would be key points.

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